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HOW CAN WE FORECAST AN EARTHQUAKE?

Овчинников С.Д.
Научный руководитель Шагалина О.В.
Сибирский Федеральный университет

Earthquakes-are underground shocks and vibration of the Earth's surface caused by nature processes (mainly tectonic processes) or artificial processes (explosions, underground excavation). We live on the tectonic plates which tell us that the Earth's rigid outer shell (lithosphere) is broken into a mosaic of oceanic and continental plates. They can slide over the plastic asthenosphere, upper most layer of the mantle. The plates are in constant motion. These oceanic and continental plates are forming Earth's surface and interact with each other causing vibration in the deep of planet, which cause an earthquakes.

Geology is one of main part in seismology. There are three main types of faults, all of which may cause an earthquake: normal, reverse and strike-slip. Normal and reverse faulting are examples of dip-slip, where the displacement along the fault is in the direction of dip and movement on them involves a vertical component. Normal faults occur mainly in areas where the crust is being extended such as a divergent boundary. Reverse faults occur in areas where the crust is being shortened such as at a convergent boundary. Strike-slip faults are steep structures where the two sides of the fault slip horizontally past each other, transform boundaries are a particular type of strike-slip fault. Many earthquakes are caused by movement on faults that have components of both dip-slip and strike-slip; this is known as oblique slip. Reverse faults, particularly those along convergent plate boundaries are associated with the most powerful earthquakes, including almost all of those of magnitude 8 or more. Strike-slip faults, particularly continental transforms can produce major earthquakes up to magnitude 8. Earthquakes associated with normal faults are generally less than magnitude 7. This is so because the energy released in an earthquake, and thus its magnitude, is proportional to the area of the fault that rift and the stress drop. Therefore, the longer the length and the wider the width of the faulted area, the lager the resulting magnitude.

Strike-slip faults tend to be oriented near vertically, resulting in an approximately width of 10 km within the fragile crust, thus earthquakes with magnitudes much larger than 8 points are not possible. Maximum magnitudes along many normal faults are even more limited because many of them are located along spreading centers, as in Iceland, where thickness of the fragile layer is only 6 km. There exists a chain of stress level in the fault types. Thrust faults generated by the highest, strike-slip by medium and normal faults by the lowest stress levels. Normal faults: the rock mass is pushed down in a vertical direction, thus the pushing force equals the weight of the rock mass. In the case of thrusting, the rock mass escapes in the direction of the least principal stress, upward, lifting the rock mass up. Strike-slip faulting is medium between the other two types described above. This difference in stress time in the three faulting areas can contribute to difference in stress drop during faulting, which contributes to differences in the released energy, no matter types of fault.

Earthquake is a released powerful energy, stress from stained rocks. When this stress is released quickly, it sends massive vibrations, called seismic waves. Scientists assign a magnitude rating of earthquakes. It is based on the strength and duration of their seismic waves. A quake from 3 to 5 point is considered minor or not strong; a quake from 5 to 7 is moderate or strong; Quake from 8 or more is great; on average a magnitude 8 quake strikes somewhere every year and approximately 10,000 people die due to earthquakes annually. The magnitude of most earthquakes is measured on the Richter scale, invented by Charles F. Richter in 1934. The Richter magnitude is calculated from the amplitude of the largest seismic wave recorded for the earthquake, no matter what type of wave was the strongest. The

Richter magnitudes are based on the logarithmic scale (base 10). What this means is that for each whole number you go up on the Richter scale, the amplitude of the ground motion recorded by a seismograph goes up ten times. Scale is limited to 12 points for convenience.

To explain process of the earthquake we can use Earth's magnetic field. One of the keys of plate tectonic is the discovery that the Earth's magnetic field has reversed its polarity 170 times in the last 80 million years. As new basaltic material is squeezed up into the midocean cracks and solidifies, it is magnetized according to the polarity of the Earth's magnetic field. If the field reverses its polarity, the strip of new material is magnetized in an opposite sense. As the oceanic floor continues to spread, the new strips of rock are carried away on either side like a conveyer belt. Using these magnetic strips as evidence of movement it became obvious that the Earth's surface consisted of a mosaic of crustal plates which are continually jostling one another. It means if the Earth changes polarity (for example: interacting with moon's polarity or with other object) that each of tectonic plates changes polarity too.

But humanity doesn't have answer on question: How can an earthquake be predicted? The idea that animals can forecast earthquakes is not a new one. For more than 2000 years people have reported unusual animal behavior just minutes or hours before powerful seismic events. But a modern technology can detect the migration routes of flying animals. But As well as monitoring migrations, ornithologists look for unusual movements of animals and they can guess whether flying animals can be used as "intelligent sensors" of impending earthquakes. Birds and bats might serve the purpose because of their ability to detect magnetic fields. This capability probably helps the creatures navigate and it could also allow them to sense earthquakes before they strike. Cause of all earthquakes is the build-up of stress in subsurface rocks, invisible at the Earth's surface. But laboratory tests revealed the stresses which cause earthquakes can be detected electromagnetically. Currently the only evidence that flying animals can sense the magnetic disturbance which occurs before earthquake is considered to be anecdotal. But it is a scientific fact of Nature and science should use it to forecast the earthquake. It may be a separate subject of seismology in the nearest future because process of releasing energy is very rapid and nature feels nature better than people feel it.

Modeling and monitoring have an important meaning in this sphere. Mathematical model can be built based on the past data. Using these models scientists can explain the mechanism of these nature disaster-Earthquakes. But for forecast science needs more experience and modern technology.

Krasnoyarsk can't become the epicenter of the earthquake because it hasn't got the tectonic faults in its territory. The south of Russia is in seismic activity, especially mountain belt (Altai, Sayani). Epicenter usually forms there and vibration spreads to the other regions. Long distance between our territory and the southern regions give us an advantage, that's why our seismic station fixes vibrations from 2 to 4 points.

It becomes obvious that to predict the earthquake we should learn this process more deeply and with the impact of some factors like: Moon, Sun, Magnetic field, rotation of the Earth, convention processes in the Earth's core. Furthermore every second human's brain sends the invisible electrical impulse in space and interacts with small particles of all space. The Universe expends continuously and it means that processes change everything all the time.